



Find the Determinants

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Show all work for full credit. Use separate sheet of paper if needed. Find the determinants of the given matrices.

1. **Problem 1:** Given matrix $A = \begin{pmatrix} 8 & 3 \\ 2 & 7 \end{pmatrix}$.

2. **Problem 2:** Given matrix $B = \begin{pmatrix} 4 & -1 & 2 \\ -2 & 6 & 5 \\ 0 & 3 & 1 \end{pmatrix}$.

3. **Problem 3:** Given matrix $C = \begin{pmatrix} -3 & 5 \\ 6 & -8 \end{pmatrix}$.

4. **Problem 4:** Given matrix $D = \begin{pmatrix} 0 & 4 & 1 \\ 2 & 0 & 3 \\ 4 & 1 & 0 \end{pmatrix}$.

5. **Problem 5:** Given matrix $E = \begin{pmatrix} 3 & 7 \\ 2 & 5 \end{pmatrix}$.

6. **Problem 6:** Given matrix $F = \begin{pmatrix} 6 & -5 \\ -3 & 4 \end{pmatrix}$.

7. **Problem 7:** Given matrix $G = \begin{pmatrix} 7 & 0 & 4 \\ 2 & 4 & 5 \\ 0 & -2 & 3 \end{pmatrix}$.

8. **Problem 8:** Given matrix $H = \begin{pmatrix} 3 & 7 \\ 9 & 1 \end{pmatrix}$.

9. **Problem 9:** Given matrix $I = \begin{pmatrix} -1 & 3 \\ 4 & -5 \end{pmatrix}$.

10. **Problem 10:** Given matrix $J = \begin{pmatrix} 0 & 2 & 1 \\ 3 & -1 & 4 \\ 5 & 2 & 3 \end{pmatrix}$.

Solutions

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Problem 1: Given matrix $K = \begin{pmatrix} 8 & 3 \\ 2 & 7 \end{pmatrix}$.

Solution:

1. Write the determinant:

$$\det(K) = 8 \cdot 7 - 3 \cdot 2$$

2. Write the multiplication steps in a row:

$$8 \cdot 7 = 56, \quad 3 \cdot 2 = 6$$

3. Simplify multiplicative steps:

$$56 - 6$$

4. Simplify for final answer:

Answer: 50

Problem 2: Given matrix $L = \begin{pmatrix} 4 & -1 & 2 \\ -2 & 6 & 5 \\ 0 & 3 & 1 \end{pmatrix}$.

Solution:

1. Write the determinant:

$$\det(L) = 4(6 \cdot 1 - 5 \cdot 3) - (-1)(-2 \cdot 1 - 5 \cdot 0) + 2(-2 \cdot 3 - 6 \cdot 0)$$

2. Write the multiplication steps in a row:

$$4(6 - 15) + 1(2) + 2(-6)$$

3. Simplify multiplicative steps:

$$4(-9) + 2 - 12$$

4. Simplify for final answer:

$$\text{Answer: } -36 + 2 - 12 = -50$$

Problem 3: Given matrix $M = \begin{pmatrix} -3 & 5 \\ 6 & -8 \end{pmatrix}$.

Solution:

1. Write the determinant:

$$\det(M) = (-3) \cdot (-8) - 5 \cdot 6$$

2. Write the multiplication steps in a row:

$$-3 \cdot -8 = 24, \quad 5 \cdot 6 = 30$$

3. Simplify multiplicative steps:

$$24 - 30$$

4. Simplify for final answer:

$$\text{Answer: } -6$$

Problem 4: Given matrix $N = \begin{pmatrix} 0 & 4 & 1 \\ 2 & 0 & 3 \\ 4 & 1 & 0 \end{pmatrix}$.

Solution:

1. Write the determinant:

$$\det(N) = 0(0 \cdot 0 - 3 \cdot 1) - 4(2 \cdot 0 - 3 \cdot 4) + 1(2 \cdot 1 - 0 \cdot 4)$$

2. Write the multiplication steps in a row:

$$0 - 4(-12) + 1(2)$$

3. Simplify multiplicative steps:

$$0 + 48 + 2$$

4. Simplify for final answer:

Answer: 50

Problem 5: Given matrix $E = \begin{pmatrix} 3 & 7 \\ 2 & 5 \end{pmatrix}$.

Solution:

1. Write the determinant:

$$\det(E) = 3 \cdot 5 - 7 \cdot 2$$

2. Write the multiplication steps in a row:

$$3 \cdot 5 = 15, \quad 7 \cdot 2 = 14$$

3. Simplify multiplicative steps:

$$15 - 14$$

4. Simplify for final answer:

Answer: 1

4. Simplify for final answer:

Answer: -2

Problem 6: Given matrix $F = \begin{pmatrix} 6 & -5 \\ -3 & 4 \end{pmatrix}$.

Solution:

1. Write the determinant:

$$\det(F) = 6 \cdot 4 - (-5) \cdot (-3)$$

2. Write the multiplication steps in a row:

$$6 \cdot 4 = 24, \quad -5 \cdot -3 = 15$$

3. Simplify multiplicative steps:

$$24 - 15$$

4. Simplify for final answer:

Answer: 9

Problem 7: Given matrix $G = \begin{pmatrix} 7 & 0 & 4 \\ 2 & 4 & 5 \\ 0 & -2 & 3 \end{pmatrix}$.

Solution:

1. Write the determinant:

$$\det(G) = 7(4 \cdot 3 - 5 \cdot (-2)) - 0(2 \cdot 3 - 5 \cdot 0) + 4(2 \cdot (-2) - 4 \cdot 0)$$

2. Write the multiplication steps in a row:

$$7(12 + 10) + 4(-4)$$

3. Simplify multiplicative steps:

$$7(22) - 16$$

4. Simplify for final answer:

Answer: $154 - 16 = 138$

Problem 8: Given matrix $H = \begin{pmatrix} 3 & 7 \\ 9 & 1 \end{pmatrix}$.

Solution:

1. Write the determinant:

$$\det(H) = 3 \cdot 1 - 7 \cdot 9$$

2. Write the multiplication steps in a row:

$$3 \cdot 1 = 3, \quad 7 \cdot 9 = 63$$

3. Simplify multiplicative steps:

$$3 - 63$$

4. Simplify for final answer:

$$\text{Answer: } -60$$

Problem 9: Given matrix $I = \begin{pmatrix} -1 & 3 \\ 4 & -5 \end{pmatrix}$.

Solution:

1. Write the determinant:

$$\det(I) = (-1) \cdot (-5) - 3 \cdot 4$$

2. Write the multiplication steps in a row:

$$5 - 12$$

3. Simplify multiplicative steps:

$$5 - 12$$

4. Simplify for final answer:

$$\text{Answer: } -7$$

Problem 10: Given matrix $J = \begin{pmatrix} 0 & 2 & 1 \\ 3 & -1 & 4 \\ 5 & 2 & 3 \end{pmatrix}$.

Solution:

1. Write the determinant:

$$\det(J) = 0(-1 \cdot 3 - 4 \cdot 2) - 2(3 \cdot 3 - 4 \cdot 5) + 1(3 \cdot 2 - (-1) \cdot 5)$$

2. Write the multiplication steps in a row:

$$0 + 2(-9 + 20) + 1(6 + 5)$$

3. Simplify multiplicative steps:

$$0 + 2(11) + 11$$

4. Simplify for final answer:

$$\text{Answer: } 22 + 11 = 33$$

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